HF topical group plans for tracker review

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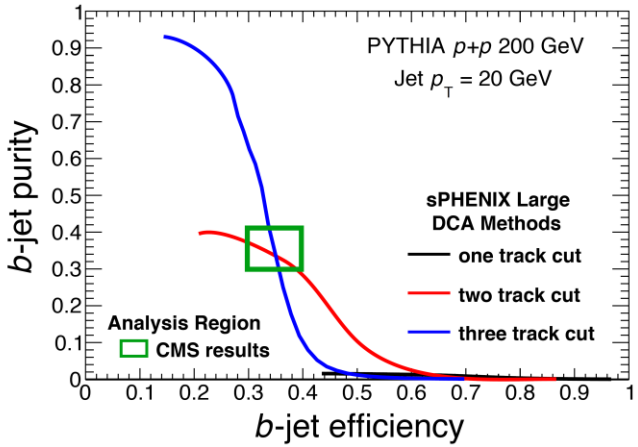
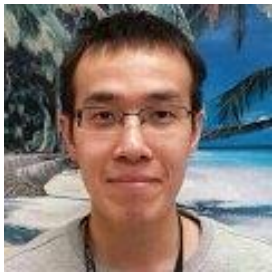
Overview



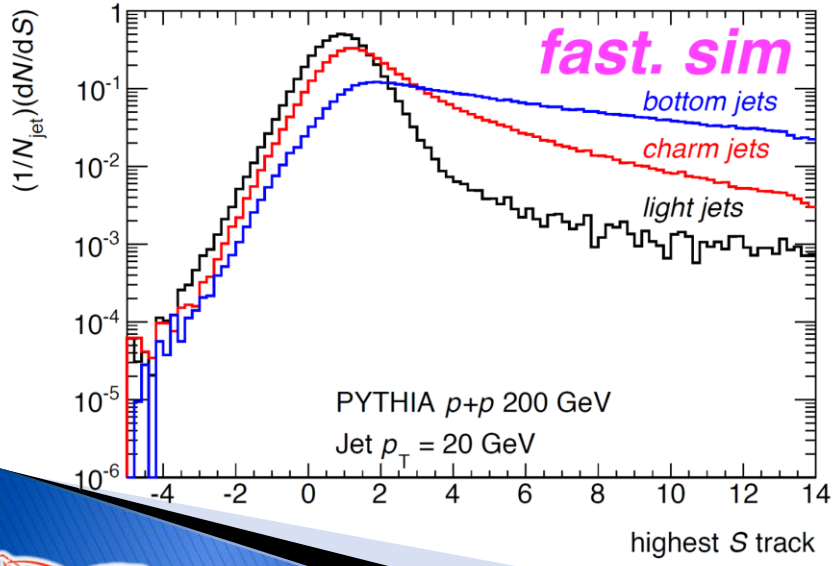
- Target B-jet tagging performance plots
  - High DCA track counting : Establishing G4-based procedure beyond fast sim.
  - Secondary vertex: Developing RAVE based secondary vertex finder.
  - Reevaluate tagging in central Au+Au embedded events and pile up
    - Depending on p-p analysis and tracking software progress
- Unifying truth definition and jet sample generations
  - Based on Dennis' work defining a truth tagging module run on MB events to synchronize B-jet definition and yield between analyzers
  - Two options provided in tagging truth jet by matching B-quark in jet (CMS definition) or matching B-hadron in jet (proposal definition)
  - Available on GitHub: https://github.com/sPHENIX-Collaboration/analysis/tree/master/HF-Jet/TruthGeneration
- Regular updates on B-tagging simulation utilizing weekly simulation meetings

B-jet tagging – High DCA track counting

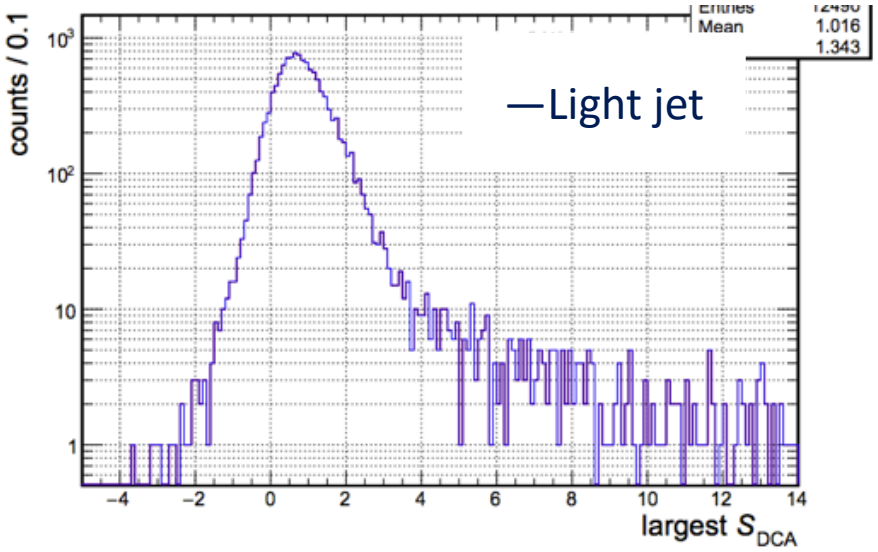
- Recent progress
  - Dennis implemented tagging in full Geant4 simulation, under testing
  - Haiwang followed up the procedure under Dennis' guidance
- Next
  - Verify the Geant4-based tracking procedure
  - Produce purity VS efficiency plots



Dennis P.: Fast sim in proposal

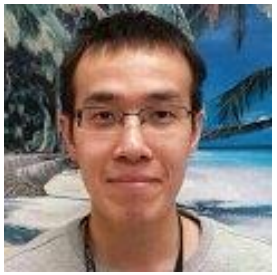


Haiwang Y.: continuing Dennis work on full G4 sim



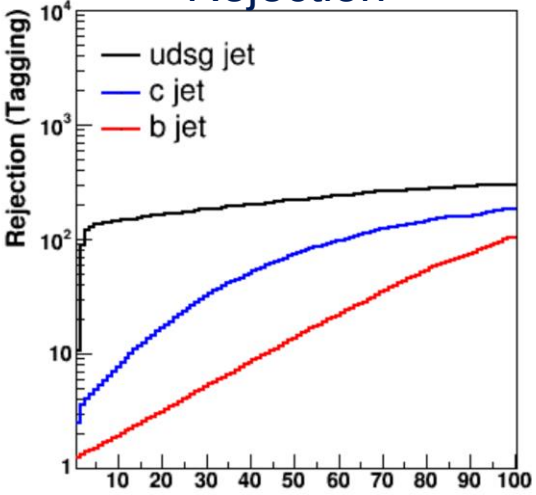
B-jet tagging – Secondary vertex

- Recent progress
  - Haiwang developed new Kalman filter (GenFit2) with vertex finder integration (RAVE)
  - Sanghoon implemented Secondary vertex finder in jet
  - Rejection based on cut on the significance of most deviated vertex in jet
- Plan next:
  - Purity results plots and test on Reference tracker and



p+p @ 200 GeV Pythia8, **7layer MAPS** → sPHENIX Geant4 → RAVE

Rejection



Cuts on sigma deviation of max displaced vertex in jet

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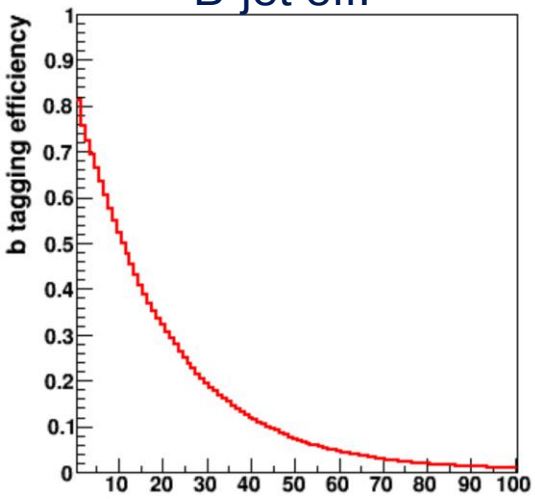
B-jet eff.



Cuts on sigma deviation of max displaced vertex in jet

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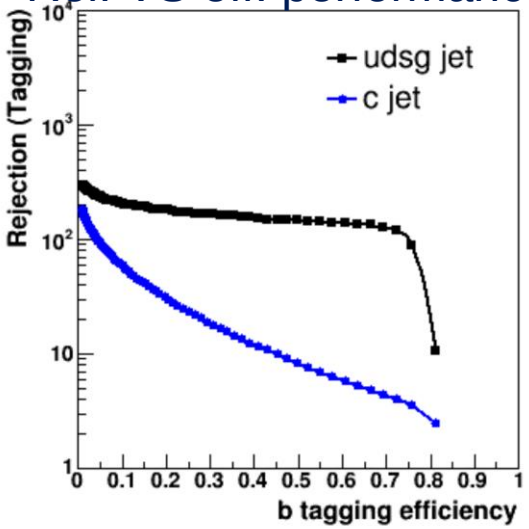
Rel. VS eff. performance



From Sanghoon's talk https://indico.bnl.gov/conferenceDisplay.py?confId=1923

From previous meetings

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High priority longer-term tasks

- Goal: realistic study of HF jet performance in sPHENIX simulation and reconstruction.
- Target time scale: tracking review
- High priority development tasks (help wanted):
  - Realistic implementation in Geant4
    - Tony F./Gaku M./Chris P., lots of progress
  - Generalized Kalman filter
    - Haiwang Y./Chris P., close to completion
  - Multi-vertexing/B-tagging via secondary vertexing in jet
    - Sanghoon L./Haiwang Y.: exploring RAVE option
  - B-jet tagging: Track Counting
    - Dennis P.: lots of progress in past weeks
  - B-jet tagging: Soft Lepton Tagging
    - Jin H. (+ Help)
  - B-jet tagging: B-Meson Tagging
    - Volunteer needed!